a controller, adapted to control said light emitting device to emit said emitted light in pulses having a duty cycle less than about 10%.

Please cancel claims 5, 6 and 13.

15. A method for examining a particle in a flow stream of a flow cytometer, comprising:

activating a light emitting device to cause at least one incoherent light emitting semiconductor device to emit light toward said flow stream;

detecting light emanating from said particle in response to said emitted light striking said particle; and

controlling said light emitting device to emit said emitted light in pulses having a duty cycle less than about 10%.

Please cancel claims 19-20.

21.

activating a second light emitting device to emit a second substantially coherent light toward said flow stream.

A method as claimed in claim 15, further comprising:

Please add the following new claims 26-51:

26. (New) An apparatus for examining a particle in a flow stream of a flow

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FOREWORD

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THE NATURE OF CORPUSCULAR RADIATION IN THE UPPER ATMOSPHERE (USSR)

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Summary

On the basis of an analysis of the space distribution of "earth corona" belts, it is possible to draw a number of conclusions concerning the mechanism of generation and "leakage (or dissipation)" of hard particles (corpuscles). It was shown that the concentration of particles in the solar corpuscular stream is sufficiently high to effect a renewal of particles in the external belt during a period of approximately several hours. The energy distribution of protons and the velocity of generation of hard particles in the internal belt were calculated on the basis of the decay mechanism of neutrons formed in stars, taking into account the moderation of these neutrons during their diffusion through the atmosphere. It was shown that the recording of hard charged corpuscular components of nuclear explosions clearly distorts, for a certain period of time, measurements of the intensity of corpuscular radiation in the "earth corona", particularly in the high energy region.

Research conducted with the aid of Soviet and American artificial earth satellites resulted in the discovery of a region of intensive corpuscular radiation, starting at an altitude of 400-600 km (1-4). On the basis of recent results, obtained with the aid of cosmic rockets, it was possible to obtain a picture of the space distribution of the intensity of the hard corpuscular radiation surrounding the earth (5,6). At the same time, it was discovered that two "belts" of corpuscular radiation are present. The first, or internal, belt is an equatorial ring limited (approximately) by the geomagnetic latitudes \$\pmu_10^{\circ}\$ (according to [6], the width of this belt is somewhat smaller), with a maximum concentration at an altitude of approximately 3,000 km (above the geomagnetic equator). The second, or external, belt extends to a distance of up to 6-8 earth radii, and the maximum concentration of

particles in this belt is located at a distance of 3.5-4 earth radii R_E. It is interesting to note the presence of characteristic "tongues" in the space distribution of particles in the external belt, which stretch out towards the area of maximum occurrence of Northern lights (aurora polaris). An important factor is that the hardness of particles in the internal belt is greater than in the external belt (1,4).

In order to provide an explanation for the cloud of fast charged particles surrounding the earth (this phenomenon will be further designated by us under the name of "earth corona"), a number of authors have advanced an hypothesis involving a decay of albedo neutrons, followed by a capture of the protons and electrons formed in this manner by the magnetic trap of the earth (7-9). However, in our opinion, the analysis of the space distribution of particles in both belts of the earth corona makes it impossible to explain the formation of the external belt as being due to the decay of albedo neutrons. Indeed, the presence of an equatorial belt means that the particles forming this belt "avoid" moderate and high geomagnetic latitudes. Apparently, this results from the fact that geomagnetic disturbances and Northern lights occurring at higher latitudes appear to "shake out" particles from the internal belt, thereby preventing the accumulation of particles in this belt. This means, however, that the equatorial belt is replenished with particles coming only from below, from the lower layers of the earth's atmosphere.

On the contrary, the space distribution of particles in the external belt clearly indicates that these particles are replenished from an extraterrestrial source. The particles produced by this source are apparently unable to reach relatively low altitudes. On the other hand, particles in the external belt, located in the magnetic trap at a distance of 3.5-4 Rg, will accumulate in this trap during a longer period of time than at a distance of 5-6 Rg, since the frequency and amplitude of geomagnetic disturbances at 50-60° latitudes (reached by lines of force bisecting the plane of the equator at a distance of 3.5- $\ln R_{\rm T}$) are many times lower than in areas of maximum occurrence of Northern lights. This fact precisely explains the observed position of the maximum particle concentration in the external belt. The different origin of particles in both belts is also expressed in their different hardness. Thus, on the basis of an analysis of the space distribution of particles in the earth corona, it is possible to draw the conclusion that geomagnetic disturbances and Northern lights connected with these disturbances constitute the principal reason for the "leakage" of particles in the external (and also apparently in the internal) zone. Naturally, in case of the internal belt, we can only be concerned with Northern lights occurring at low altitudes, which are rather rare.

During geomagnetic disturbances, the regular nature of the field at high altitudes becomes disturbed, and particles imprisoned up to that time in the trap can escape both into interplanetary space and downwards into desner layers of the earth's atmosphere, thus causing the phenomenon known as Northern lights. The escape of particles from the trap into lower layers is connected with a derangement of the conditions governing the applicability of the adiabatic invariant. The main reason for this derangement, in our opinion, is the following one. If, at the time the solar particles penetrate into the earth's atmosphere, the energy density of the particles in the upper atmospheric layers will become approximately equal to the energy density of the magnetic field of the earth, the actual concept of the movement of a charged particle in a given external magnetic field (leading to the adiabatic invariant) loses all its meaning. A similar situation arises in case of a rapid "vibration" of magnetic lines of force. In this case, the magnetic moment of certain particles at high altitudes can undergo a substantial increase. Such particles will then be able to penetrate into regions of relatively greater magnetic intensity. Since each particle vibrates along the lines of force with a sufficiently high frequency, there will be a considerable probability for such a favorable reorientation of its velocity vector into upper atmospheric regions, where the terrestrial magnetic field is strongly deformed by solar corpuscular streams.

Another fact must also be considered, namely that the "stockpile" of particles held in the trap of the external belt is small in comparison with the number of solar particles which, during the period of geomagnetic disturbances, travel through an area equal in size to the effective cross section area of the terrestrial magnetic field. It is doubtful that the maximum concentration of particles in the external belt exceeds 2 10 cm-3, if we assume that the average energy of each particle 7 = 104 ev. If this were not the case, the energy density of particles in the earth corona would be greater than the energy density of the terrestrial magnetic field at corresponding distances. In case the average energy of particles is greater than 104ev, the maximum permissible concentration of such particles would be even smaller. view of the fact that the field of the earth, in case $R \leq (4-6)R_{r}$. retains its dipole nature in the first approximation (which is apparent already from the fact that an external belt is present and from the nature of the relative distribution of particles in this belt), the upper limit of the particle concentration must be even smaller. The effective volume of the external belt, according to data published in (5,6), can be estimated as being equal to - 1029 cu.cm. Consequently, we can assume that the maximum number of particles in this belt is equal to N $\sim 3.10^{29}$. If $\lesssim 10^{3}$ ev (which is quite probable), then N $\sim 3.10^{30}$.